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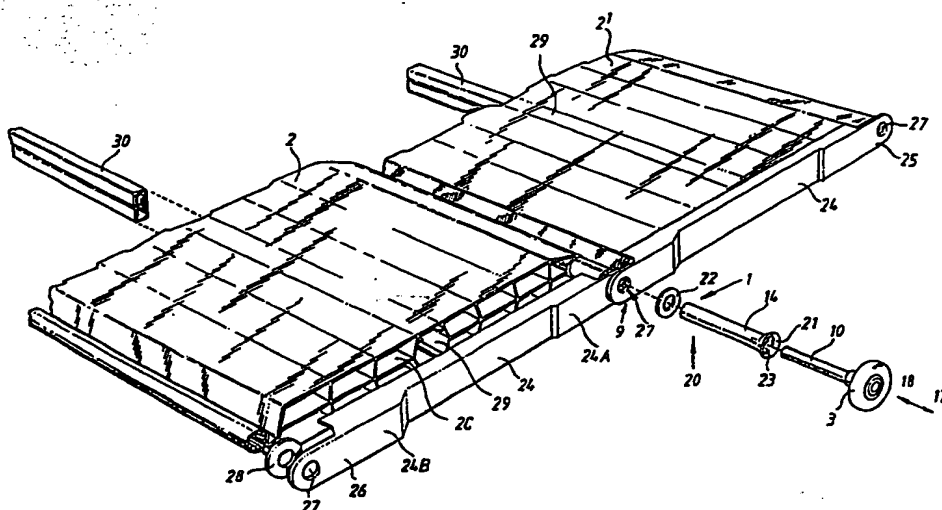
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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/SE90/00341 (22) International Filing Date: 22 May 1990 (22.05.90) (30) Priority data: 8901857-6 25 May 1989 (25.05.89) SE (71) Applicant (for all designated States except US): CRAWFORD DOOR AB [SE/SE]; Box 160, S-423 21 Torslanda (SE). (72) Inventor; and (75) Inventor/Applicant (for US only): BENGTSSON, Fred [SE/SE]; Kyrkås Trappor 3, S-433 31 Partille (SE). (74) Agent: AWAPATENT AB; Box 53252, S-400 16 Göteborg (SE).</p>		<p>(81) Designated States: AT, AT (European patent), AU, BB, BE (European patent), BF (OAPI patent), BG, BJ (OAPI patent), BR, CA, CF (OAPI patent), CG (OAPI patent), CH, CH (European patent), CM (OAPI patent), DE*, DE (European patent)*, DK, DK (European patent), ES, ES (European patent), FI, FR (European patent), GA (OAPI patent), GB, GB (European patent), HU, IT (European patent), JP, KP, KR, LK, LU, LU (European patent), MC, MG, ML (OAPI patent), MR (OAPI patent), MW, NL, NL (European patent), NO, RO, SD, SE, SE (European patent), SN (OAPI patent), SU, TD (OAPI patent), TG (OAPI patent), US.</p> <p>Published With international search report. With amended claims.</p>

(54) Title: AN ARRANGEMENT IN DOORS



(57) Abstract

An arrangement (1) in doors of the kind comprising a plurality of door panels (2, 21) which are hingedly interconnected in rows and which are arranged to move along guide tracks extending along the intended path of movement of the door by means of rollers (3) operative between the guide tracks and the door panels. The invention allows the door to be mounted and supported in a simple and efficient manner. The hinge joint (9) between two interconnectable door panels which in a manner known per se present along their edges channel-shaped snap-fit hinge interconnecting members (15, 16), is designed to support the shaft (10) on which the associated roller (3) is mounted, in the interior of its reception space (11) in the median centre plane through the door panels, and a plurality of radially extending supports (13) are provided internally in the reception space of one of said hinge interconnecting members so as to cooperate with the roller mounting means.

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AN ARRANGEMENT IN DOORS

The present invention concerns an arrangement in doors of the kind comprising a plurality of door panels arranged in hingedly interconnected rows, said door panels arranged to move along guide tracks extending along the intended path of movement of the door by means of rollers operative between the guide tracks and the door panels, said door panels being made from a plastics material.

From SE-A-8802736-2 is known a door structure comprising a plurality of door panels which are interconnected in rows and which are made from a plastic material. The door panels are provided with rollers at their side edges. However, the hinge mechanism interconnecting the door panels is unsatisfactory inasmuch as it does not permit efficient mounting of the rollers, a problem which it is one of the objects of the present invention to solve.

In SE-B 7007292-1 is disclosed a door hinge comprising a roller which is mounted in an articulated joint. However, this prior-art solution does not either function satisfactorily, since an angle arm is required to ensure that the mounted roller will be positioned in the centre of the door panel.

Known mounting and hinge joint constructions do not either permit the various steps of assembling the components to be performed in a simple manner, such as e.g. attaching the door panels to one another, since considerable clear space laterally is required relative to the panels and the assembled door, which makes it difficult to mount and assemble the door in situ. These problems and others are solved by means of the arrangement in accordance with the present invention.

The purposes outlined in the foregoing are achieved in an arrangement which is essentially characterized therein that the hinge joint between two interconnectable door panels which in a manner known per se present along juxtaposed edges channel-shaped snap-fit hinge interconnecting members,

is designed to support the shaft on which the associated roller is mounted, in the interior of its reception space in such a way that the shaft lies in the median centre plane which extends in parallel to the door panels, and in that
5 a plurality of radially extending supports are provided internally in the reception space of one of said hinge interconnecting members so as to cooperate with the roller mounting means.

One preferred embodiment of the invention will be described with reference to the accompanying drawings, wherein
10

Fig. 1 is an explosive view of one end of two interconnectable door panels together with the associated roller and roller mounting means.

Fig. 2 is a perspective view of one door panel as seen
15 from one end thereof.

Fig. 3 shows the door panel from the opposite end thereof.

Fig. 4 illustrates a hinge joint between two interconnected door panels with the panels assuming an extended,
20 vertical position.

Fig. 5 illustrates the same hinge joint between two interconnected door panels with the panels extending at an angle relative to each other.

Fig. 6 is an interior view of an end cover.

25 Fig. 6A is an exterior view of the end cover of Fig. 6.

Fig. 7 shows in a partly cut view a portion of a mounted door in closed position.

Figs. 8 - 11 illustrate various stages of assembling and mounting a door in accordance with the invention, and

30 Fig. 12 illustrates schematically the steps of mounting the door tracks and the balancing mechanism.

The arrangement 1 in doors in accordance with the present invention comprises a plurality of door panels 2, 2¹, 2², 2³...2ⁿ of plastics material. The door panels are
35 designed to be hingedly interconnected in rows and, when in their assembled and interconnected condition, they are arranged to travel in guide tracks 4, 5 by means of rollers 3.

- The guide tracks 4, 5 extend on either side 6A, 6B of the opening 6 to be covered by the door 7, and alongside the intended path of movement 8 of the door. Means are provided by means of which the hinge joint 9 interconnecting two
- 5 interconnectable door panels 2-2ⁿ may accommodate, in the interior of its reception space 11, the shaft 10 on which is mounted the roller 3 associated therewith in such a manner that said shaft lies in the central medium plane 12 that extends in parallel to at least some of said door panels.
- 10 A plurality of supports 13 are provided on the internal surfaces of the reception space 11 of the associated one of the hinge interconnecting members so as to extend radially therefrom for the purpose of cooperating with the roller mounting means 10, 14.
- 15 The door panels 2-2ⁿ are formed with channel-shaped snap-fit hinge interconnecting members 15, 16 which extend alongside the edges of the door panels, allowing the latter to be joined together by snap-fitting the two members 15, 16 one into the other.
- 20 Preferably, the supports 13 are in the shape of grooves which are evenly distributed along the interior jacket face 11A of the mounting means reception space 11.
- The supports 13 are arranged in such a way that their outer end portions abut against the roller mounting shaft
- 25 10 or against a mounting sleeve 14 which is arranged to enclosingly receive a roller mounting shaft therein. Because of the resiliency of the plastics material the supports 13 are movable radially in a lateral direction when actuated by either the shaft 10 or the sleeve 14, whereby the components
- 30 incorporated in said roller mounting means are efficiently and securely retained in position while at the same time allowing self-adjustment of said rollers 3 in the axial direction indicated by double arrow 17, 18, when said rollers ride in the roller reception space 19 in the interior of
- 35 the guide tracks 4, 5.
- The roller mounting means 20 may comprise e.g. a mounting sleeve 14 having an outer enlarged portion 21, and a

mounting washer 22 and the roller mounting shaft 10 may be accommodated inside the interior cavity 23 of said sleeve so as to be freely movable therein in the axial direction 17, 18.

5 Preferably said door panels 2-2ⁿ comprise end covers 24 which are arranged to cover the profiled, laterally open side ends 2C, 2D of the door panels. The end covers 24 are formed with projecting tongues 25, 26 at each end 24A, 24B for reception therein of the roller mounting means. For
10 instance a simple tongue 25 may be formed at one end 24A and arranged to be mounted adjacent a similarly simple tongue 26 or between the side faces of a double tongue 26 formed at the opposite end 24B of a juxtaposed end cover 24 of an interconnectable door panel 2-2ⁿ. The tongues 25,
15 26 are formed with apertures 27 for reception therein of the roller mounting shaft 10 and/or of the shaft mounting sleeve 14 forming parts of the roller mounting means 20.

Mounting washers 28 may be positioned between the tongues 25, 26 and the associated door panel 2-2ⁿ in the area adjacent
20 a mounting means reception space 11.

The end covers 24 are formed with end and side flanges 24C, 24D, 24E which are arranged to grippingly engage associated door panels 2-2ⁿ.

Metal elements 30 may be inserted into the cavities
25 29 formed in the interior of the door panels 2-2ⁿ.

A door 7 in accordance with the subject invention may be assembled and mounted successively by interconnecting the door panels 2-2ⁿ one by one and inserting their rollers 3 in the guide tracks 4, 5 with the assistance of angled
30 assembly-aid guide track sections 31, 32 which are arranged to be coupled to the regular guide tracks 4, 5 at a distance X from the lower portion 6C of the associated door opening. The assembly-aid guide track sections 31, 32 may for instance be arranged to extend in a bend upwards from the regular
35 guide tracks 4, 5, as illustrated e.g. in drawing figures 8-11.

Owing to the provision of said assembly-aid track sections it becomes possible to assemble the door 7 successively from below by snap-fitting the door panels 2-2ⁿ together at an ergonomically correct level while at the same time the rollers 3 and the roller mounting means 20 associated therewith are mounted in position in the door 7. To facilitate lifting of the door 7 during the assembly and mounting thereof in the associated door opening hoisting means 33, for instance a cable 33A running around upper pulleys 33 and if desired actuated by a force-increasing means, such as a winch 33C, may be attached to the door 7 in order to lift the latter successively during the assembly and mounting thereof in the manner appearing from the drawing figures. When the door is fully assembled and mounted in position the assembly-aid guide track sections 31, 32 are removed and are replaced by regular, downwardly directed guide track sections 4¹, 5¹ which extend in the same direction as the rest of the regular guide track sections 4², 5² of the door.

Also the hoisting aid 33 is removed from the door 7 and the surrounding areas after installation of the door 7 when the latter is actuated by the door spring mechanism 34.

Fig. 12 illustrates a simplified method of assembling and mounting a door and the components pertaining thereto, such as tracks 4, 5 and springs 34 according to which the majority of the mounting and assembly steps are effected at floor level. The procedure then is as follows:

The door is delivered to the intended place of usage in the following condition: One bottom panel 35 is complete with the exception of inner and outer handles, i.e. the bottom rollers are mounted and retained in position by temporary locking screws which are intended to be removed after completion of the mounting of the entire door.

The vertical rails 4, 5 are pre-equipped with side plates 36, balancing brackets, bearings and bearing cages and spring holders. In addition, each cable drum is posi-

tioned between the balancing bracket and the side plate 36.

Using the bottom panel 35 as a "measuring rod" inserted inside the vertical rails 4, 5 deposited on the floor the rail positions in relation to the door opening are determined, whereupon bottom pivot fittings 37 are mounted. Tilting bolts and nuts are then mounted and the lock is locked. On the side lacking a lock a long bolt is inserted through the locking aperture of the rail so as to extend into the bottom roller shaft.

In the centre of the overhead rail of the door opening is mounted e.g. a double-groove pulley 38 by means of a screw or, in the case of a wood encasement, by means of a French wood-thread screw.

The uppermost panel 39 of the door is inserted into the vertical rails 4, 5 and slitted plastic sleeves are inserted between the rollers and the top panel in order to ensure the same distance between the vertical rails as the distance between the latter at the bottom panel. The upper panel 39 is locked to the rails about 1 meter from the lower edge of the side plates, the distance being equal for both horizontal rails.

The lifting loop 40 comprising a double-groove pulley 41 is hooked onto the top rollers 3. The balancing shaft including its springs 34, internal spring supports and spring tightening means are then mounted, followed by final tightening of the drum set screws while considering the position of the shafts and the rail spacings.

The door lifting cables are then attached in the cable drums a kink being made in the wires at their place of attachment to ensure that the first wire turn will be positioned close to the wire drum surface. At this point, most of the rail assembly and mounting work has been performed at floor level. The door is now raised against the wall and secured thereto by means of bolts. The service rails are loosened and the locking mechanisms of the bottom panels are also released. The assembly-aid rail sections

31, 32 and the door panels are then assembled and mounted as described in the foregoing.

The subsequent installation steps such as the mounting of the horizontal rails and ceiling-mounted fasteners as
5 well as the installation of the cables on the drums and the tightening of the springs must be performed from a ladder or a scaffolding construction.

The invention is not limited to the embodiments described in the foregoing and illustrated in the drawings but may
10 be varied in a variety of ways within the scope of the appended claims.

CLAIMS

1. An arrangement (1) in doors of the kind comprising a plurality of door panels (2-2ⁿ) arranged in hinged; interconnected rows, said door panels arranged to move along guide tracks extending along the intended path (8) of move-
5 ment of the door by means of rollers (13) operative between the guide tracks (4, 5) and the door panels (2-2ⁿ), said door panels (2-2ⁿ) being made from a plastics material, c h a r a c t e r i z e d in that the hinge joint between two interconnectable door panels which in a manner known
10 per se present along juxtaposed edges (2A, 2B) channel-shaped snap-fit hinge interconnecting members (15, 16), is designed to support the shaft (10) on which the associated roller (3) is mounted, in the interior of its reception space (11) in such a way that the shaft lies in the median
15 centre plane (12) which extends in parallel to the door panels, and in that a plurality of radially extending supports (13) are provided internally in the reception space (11) of one (16) of said hinge interconnecting members so as to cooperate with the roller mounting means (20).
- 20 2. An arrangement as claimed in claim 1, c h a r a c - t e r i z e d in that said supports (13) are in the shape of grooves and are distributed along the interior jacket face (11A) of said mounting means reception space.
- 25 3. An arrangement as claimed in claim 2, c h a r a c - t e r i z e d in that the supports (13) abut by means of their outer end portions against the roller mounting shaft (10) or against a mounting sleeve (14) enclosing said shaft and are radially movable in a lateral direction when actuated by said shaft (10) or said sleeve (14).
- 30 4. An arrangement as claimed in claim 3, c h a r a c - t e r i z e d in that said supports (13) are equally spaced along the internal jacket face (11A) of said space (11).
5. An arrangement as claimed in any one of claims 3-4, c h a r a c t e r i z e d in that the roller mounting means

(20) comprises a mounting sleeve (14) having an outer enlarged portion (21), and a washer (22) and in that the roller mounting shaft (10) is arranged for reception in the interior cavity (23) of the sleeve so as to be freely movable in
5 an axial direction (17, 18).

6. An arrangement as claimed in any one of the preceding claims, characterized therein that side covers (24) are arranged to cover the open, profiled panel sides (2C; 2D) and in that said side covers are formed
10 with projecting roller mounting means receiving tongues (25, 26) which are turned towards an interconnectable door panel and which are provided with apertures (27) arranged to receive said roller mounting shaft (10) and/or said shaft mounting sleeve (14).

15 7. An arrangement as claimed in claim 6, characterized in that said side covers (24) are formed with end and side flanges (24C, 24E) designed to grippingly engage said door panels.

8. An arrangement as claimed in any one of the preceding
20 claims, characterized by angled guide track sections (31, 32) serving as aids in interconnecting and successively inserting said door panels (2-2ⁿ) together with the rollers (3) into said guide tracks (4, 5), said angled assembly-aid guide track sections (31, 32) arranged
25 to be interconnected to said guide tracks (4, 5) at a distance (X) from the lower portion (6C) of the associated door opening.

9. An arrangement as claimed in claim 8, characterized in that said assembly-aid guide track sections (31, 32) extend in a bend upwards from the regular guide
30 tracks (4, 5).

10. An arrangement as claimed in any one of the preceding claims 8-9, characterized in that hoisting means (33), for instance a cable (33A), is arranged to be connected to the assembled door panels (2-2ⁿ) in order to
35 lift the door (7) during the mounting stage.

AMENDED CLAIMS

[received by the International Bureau on 12 October 1990 (12.10.90);
original claims 1 and 3 amended; other claims unchanged (2 pages)]

1. An arrangement (1) in doors of the kind comprising a plurality of door panels (2-2ⁿ) arranged in hingedly interconnected rows, said door panels arranged to move along guide tracks extending along the intended path (8) of movement of the door by means of rollers (13) operative between the guide tracks (4, 5) and the door panels (2-2ⁿ), said door panels (2-2ⁿ) being made from a plastics material, wherein the hinge joint between two interconnectable door panels along juxtaposed edges (2A, 2B) have channel-shaped snap-fit hinge interconnecting members (15, 16), is designed to support the shaft (10) on which the associated roller (3) is mounted, in the interior of its reception space (11), characterized in that a plurality of radially extending supports (13) are provided internally in the reception space (11) of one (16) of said hinge interconnecting members, wherein the supports (13) by means of outer end portions abut against the roller mounting shaft (10) or against a mounting sleeve (14) enclosing said shaft and are radially movable in a lateral direction when actuated by said shaft (10) or said sleeve (14).

2. An arrangement as claimed in claim 1, characterized in that said supports (13) are in the shape of grooves and are distributed along the interior jacket face (11A) of said mounting means reception space.

3. An arrangement as claimed in claim 1 or 2, characterized in that said supports (13) are equally spaced along the internal jacket face (11A) of said space (11).

4. An arrangement as claimed in any one of preceding claims, characterized in that the roller mounting means (20) comprises a mounting sleeve (14) having an outer enlarged portion (21), and a washer (22) and in that the roller mounting shaft (10) is arranged for reception in the interior cavity (23) of the sleeve so as to be freely movable in an axial direction (17, 18).

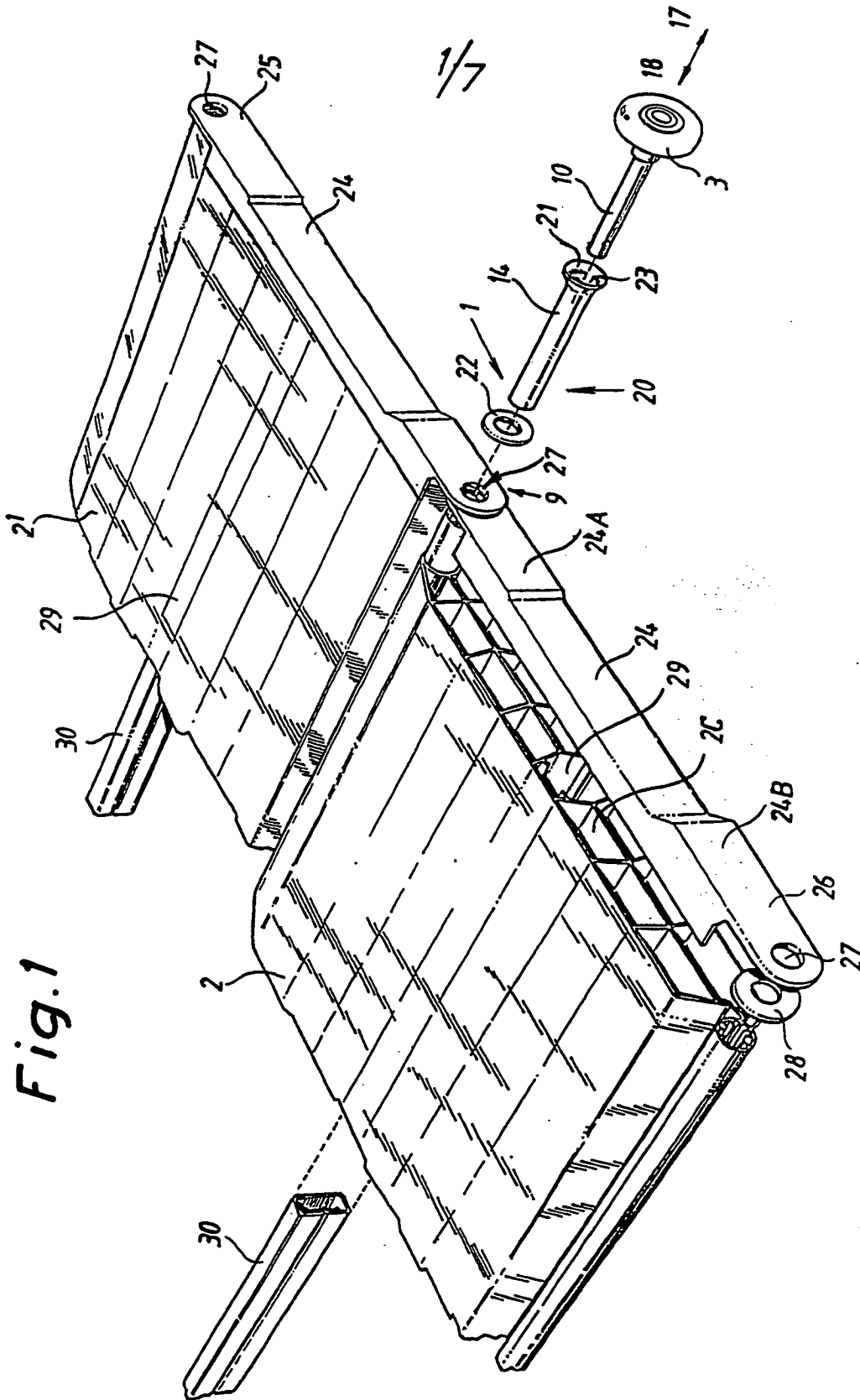
5. An arrangement as claimed in any one of the preceding claims, characterized therein that side covers (24) are arranged to cover the open, profiled panel sides (2C; 2D) and in that said side covers are formed
5 with projecting roller mounting means receiving tongues (25, 26) which are turned towards an interconnectable door panel and which are provided with apertures (27) arranged to receive said roller mounting shaft (10) and/or said shaft mounting sleeve (14).

10 6. An arrangement as claimed in claim 5, characterized in that said side covers (24) are formed with end and side flanges (24C, 24E) designed to grippingly engage said door panels.

7. An arrangement as claimed in any one of the preceding
15 claims, characterized by angled guide track sections (31, 32) serving as aids in interconnecting and successively inserting said door panels (2-2ⁿ) together with the rollers (3) into said guide tracks (4,5), said angled assembly-aid guide track sections (31, 32) arranged
20 to be interconnected to said guide tracks (4, 5) at a distance (X) from the lower portion (6C) of the associated door opening.

8. An arrangement as claimed in claim 7, characterized in that said assembly-aid guide track sections (31, 32) extend in a bend upwards from the regular guide
25 tracks (4, 5).

9. An arrangement as claimed in any one of the preceding claims 7-8, characterized in that hoisting means (33), for instance a cable (33A), is arranged to be connected to the assembled door panels (2-2ⁿ) in order to
30 lift the door (7) during the mounting stage.



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Fig.2

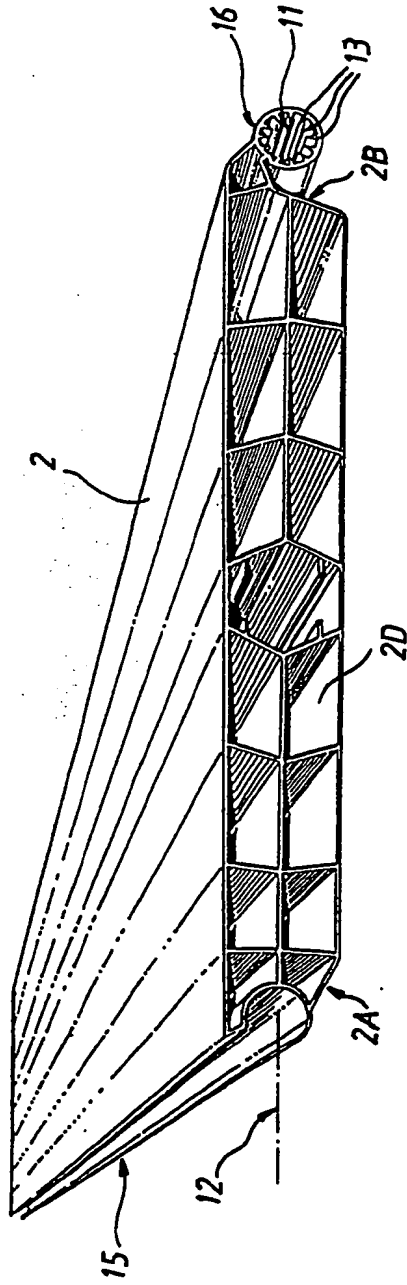
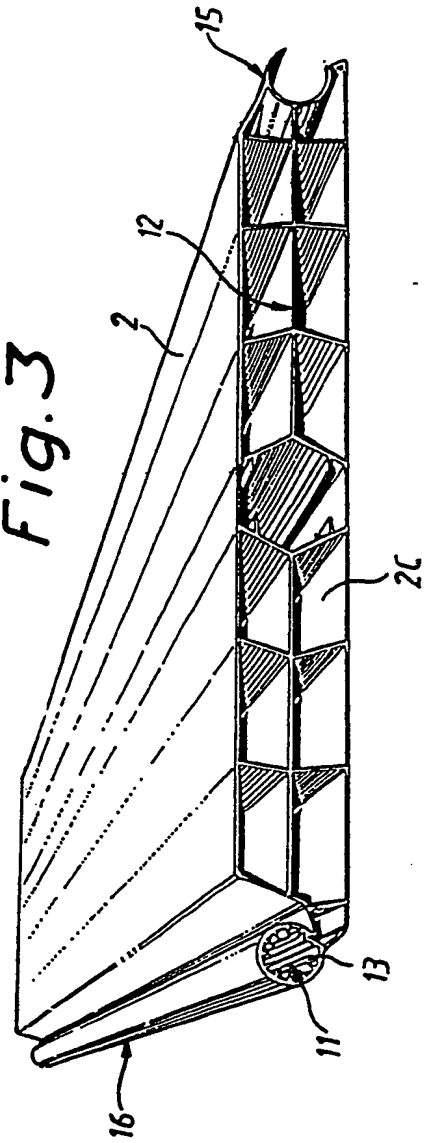


Fig.3



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Fig. 4

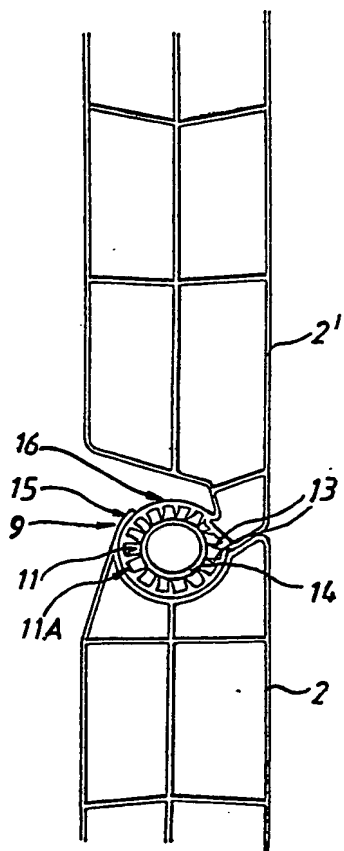


Fig. 5

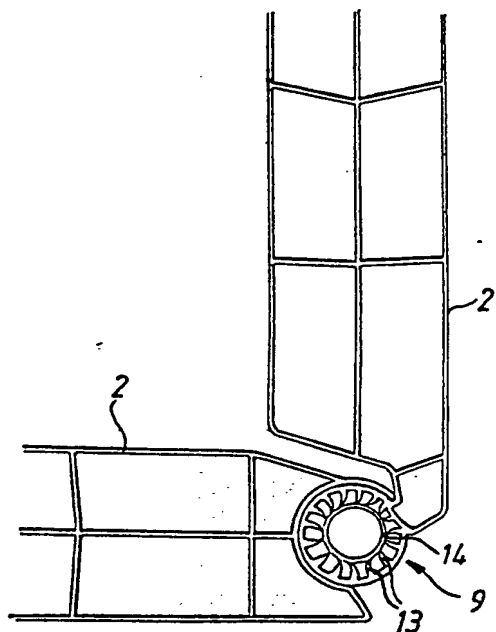


Fig. 6

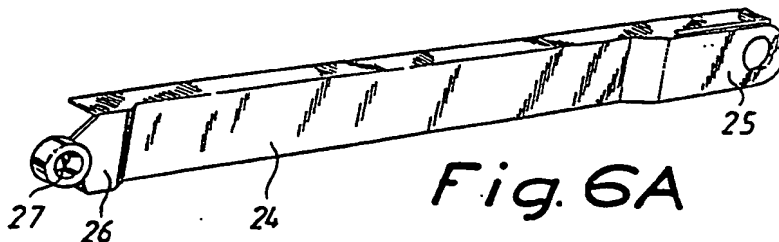
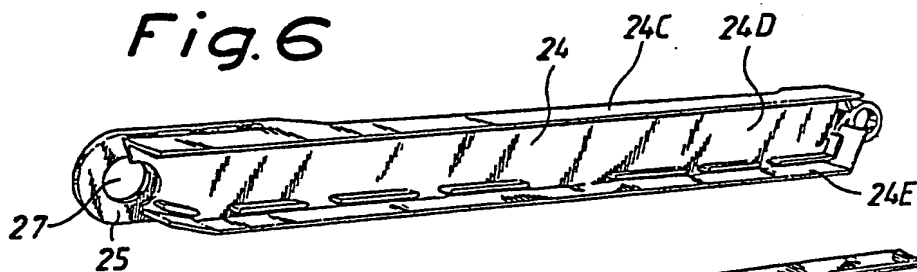
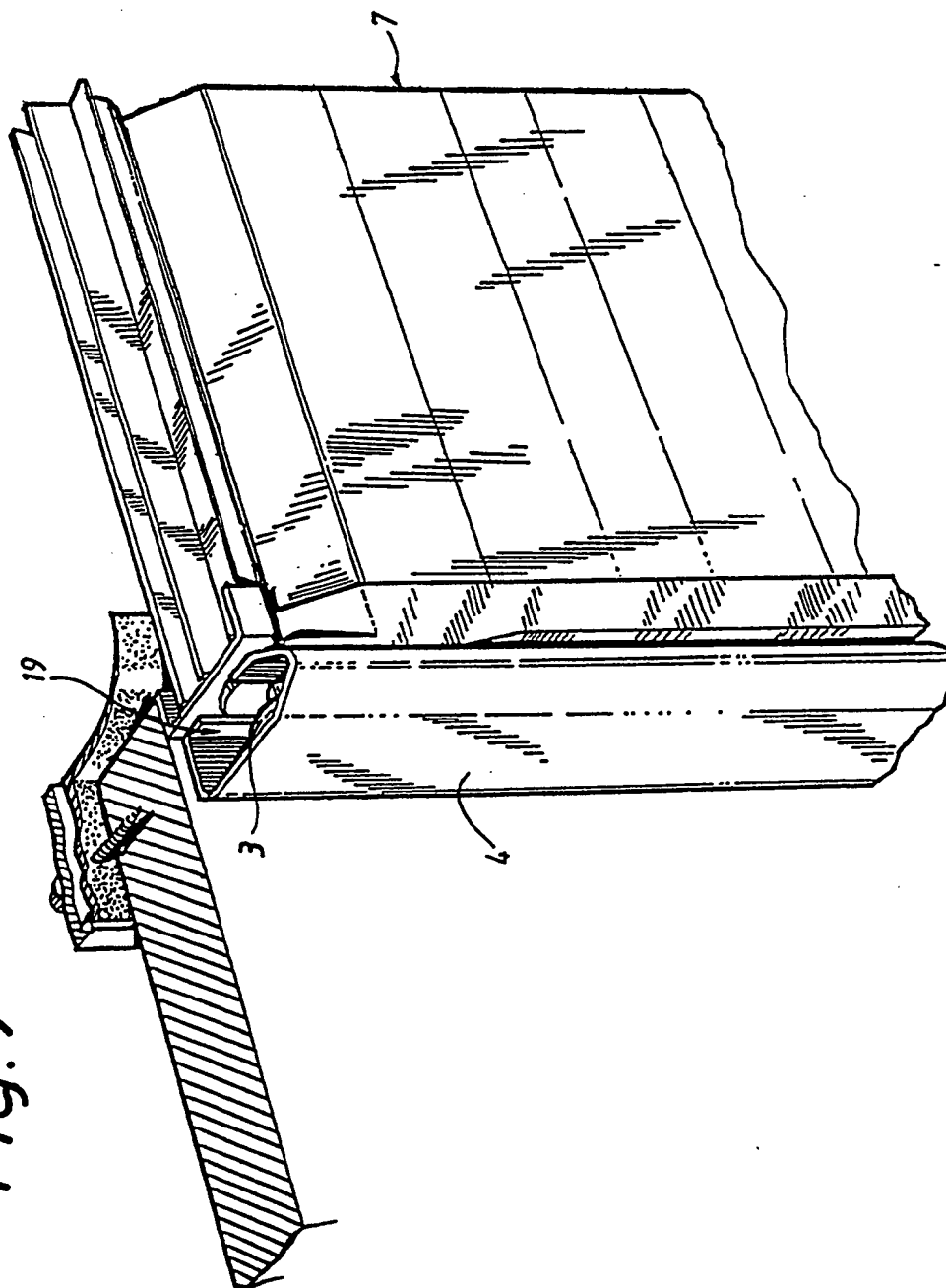


Fig. 6A

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Fig. 8

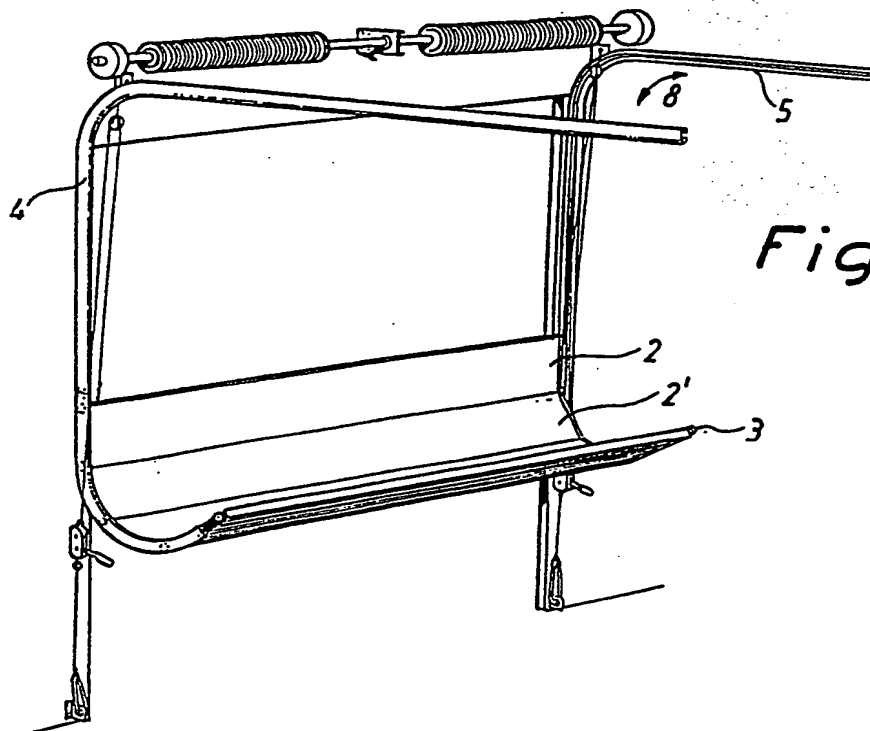
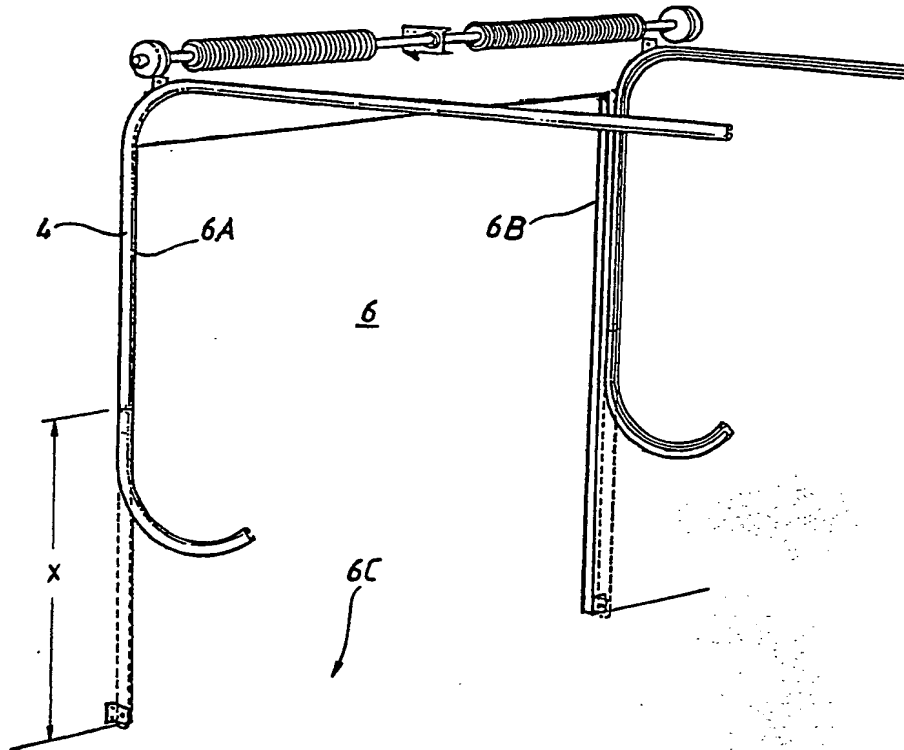
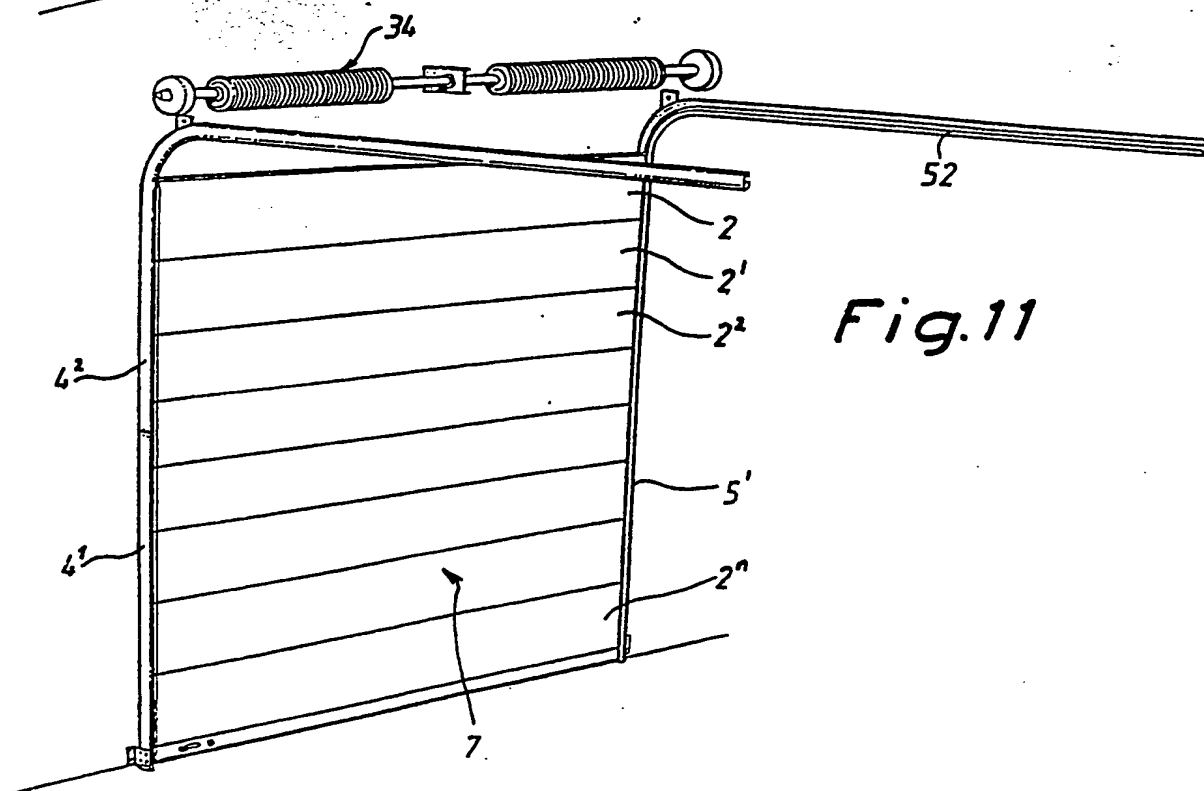
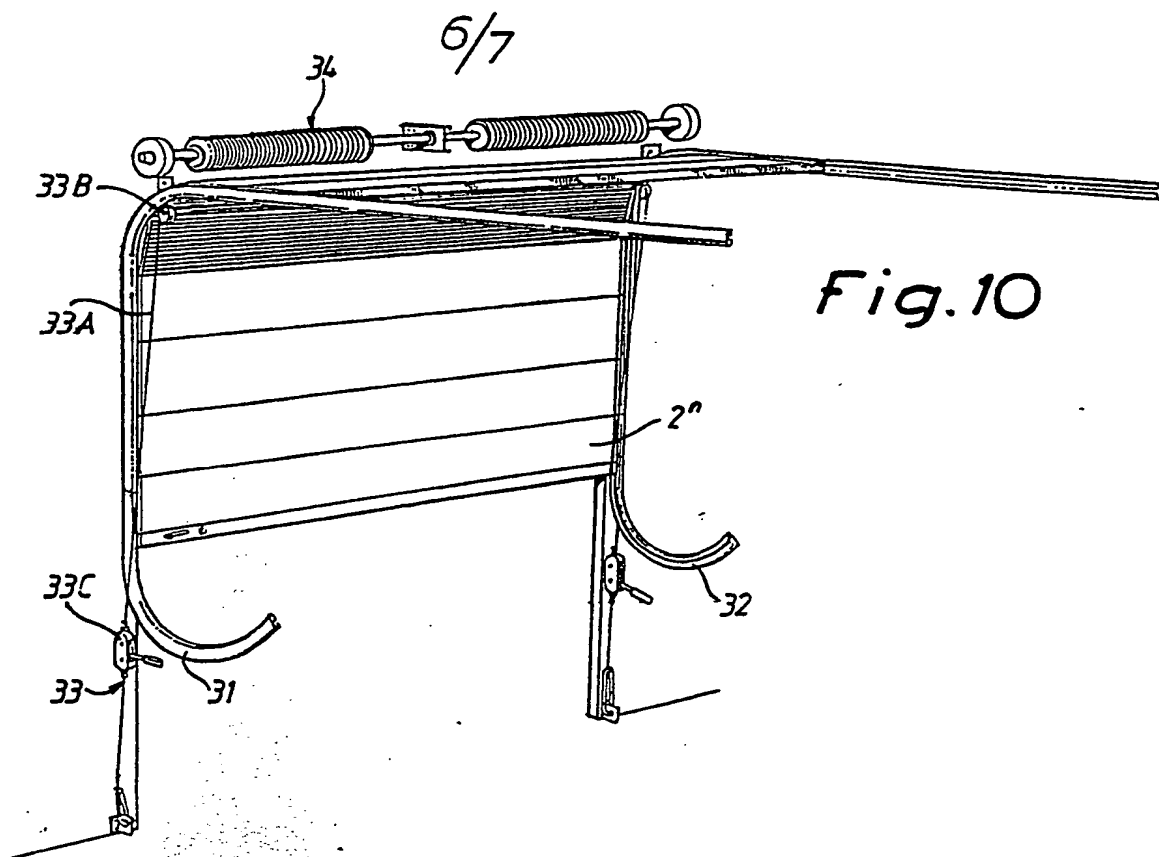


Fig. 9



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INTERNATIONAL SEARCH REPORT

International Application No PCT/SE 90/00341

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) ⁶		
According to International Patent Classification (IPC) or to both National Classification and IPC		
IPC5: E 05 D 15/24, E 06 B 3/48, E 05 D 13/00		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
IPC5	E 05 D; E 06 B	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in Fields Searched ⁸		
SE,DK,FI,NO classes as above		
III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹		
Category *	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
Y	EP, A1, 0031970 (SCHIJF, HENDRIKUS JOHANNES) 15 July 1981, see the whole document --	1,2,4-7
Y	EP, A2, 0159058 (ROLKAN N.V.) 23 October 1985, see the whole document --	1,2,4-7
Y	CA, A, 1020079 (LAMARRE, CERGE R.M. ET AL) 1 November 1977, see the whole document --	1,2,4-7
Y, P	SE, A, 8802736-2 (FERMETURES PEYRICHOU-MALAN S.A.) 28 January 1990, see the whole document -- -----	1,2,4-7
<p>* Special categories of cited documents:¹⁰</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p>		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
30th July 1990	1990 -08- 13	
International Searching Authority	Signature of Authorized Officer	
SWEDISH PATENT OFFICE	Christer Wendenius	

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO.PCT/SE 90/00341

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the Swedish Patent Office EDP file on 90-06-27. The Swedish Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A1- 0031970	81-07-15	NONE	
EP-A2- 0159058	85-10-23	CA-A- 1240471	88-08-16
		GB-A- 2155527	85-09-25
		JP-A- 60212551	85-10-24
		US-A- 4644725	87-02-24
CA-A- 1020079	77-11-01	US-A- 4081881	78-04-04
SE-A- 8802736-2	90-01-28	NONE	